

**Neutral pion production with respect to reaction plane at $\sqrt{s_{\text{NN}}} = 200$ GeV
Au+Au collisions at RHIC-PHENIX**

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It has been observed that the yield of neutral pion at high transverse momentum ($p_T > 6$ GeV/ c) region is strongly suppressed in central Au+Au collisions at Relativistic Heavy Ion Collider (RHIC), compared to the one expected from p+p collisions. This suppression is interpreted as a consequence of an energy loss of hard scattered partons in the medium (jet quenching), which results in a decrease of the yield at a given p_T . Once azimuthal angle of a particle with respect to reaction plane and centrality are measured, the path length that parton traversed can be calculated.

A new reaction plane detector was installed in the PHENIX detector in RHIC 2007 run, and the reaction plane can be determined about 2 times better than before. The improved reaction plane measurement and higher integrated luminosity in RHIC 2007 run enabled us to measure the $v_2(\pi^0)$ up to about 14 GeV/ c for 0-20 % centrality bin. We discuss the parton energy loss mechanism using the nuclear modification factor (R_{AA}) of neutral pion with respect to the azimuthal angle from reaction plane.